Extravasation from an Aneurysm during Angiography. Report of a Case with Survival

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Extravasation from an Aneurysm during Angiography. Report of a Case with Survival

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Extravasation from an intracranial aneurysm during angiography has been not infrequently reported in the literature. Although this is a serious complication of angiography, cases that survived this formidable accident have been reported sporadically, particularly past several years. The following case is an example of the aneurysmal rupture during angiography, with a good recovery after appropriate surgical treatment.

Case Report

A 53-year-old man was admitted to our department 30 days after the attack of proven subarachnoid hemorrhage. On admission he was alert but mildly disorientated to time and place. Neurologic examinations were noncontributory, and the results of the routine laboratory tests were within normal limits.

In the afternoon on the day of admission, right carotid and vertebral angiography was performed via a femoral route without complication. As the catheter could not be advanced into the left carotid artery, the left common carotid artery was percutaneously punctured. A frontal projection of the left carotid angiogram demonstrated a saccular aneurysm at the anterior cerebral-anterior communicating complex. In order to obtain a lateral angiographic series, a 10 ml bolus of the contrast medium (65% amidotrizoate meglumine, Angiografin®) was manually injected. Immediately after the injection, the patient complained of severe headaches and the blood pressure abruptly increased to 220/100 mmHg. He became stuporous and restless, but the respiration was regular and there was no gross neurologic deficits.

Lateral view of the left carotid angiogram showed the spillage of the contrast material from the aneurysm. The extravasation changed its configuration on the serial angiograms, but it was not so diffuse but circumscribed and the ventricles were not opacified (Figure 1). Computed tomography (CT) was performed immediately after angiography, and it revealed the high density areas in the suprasellar and interpeduncular cisterns. The attenuation values in these dense areas far exceeded 100 Hounsfield units, indicating the admixture of iodinated contrast medium. The lateral ventricles were also largely isodense. A niveau was seen in each lateral ventricle,

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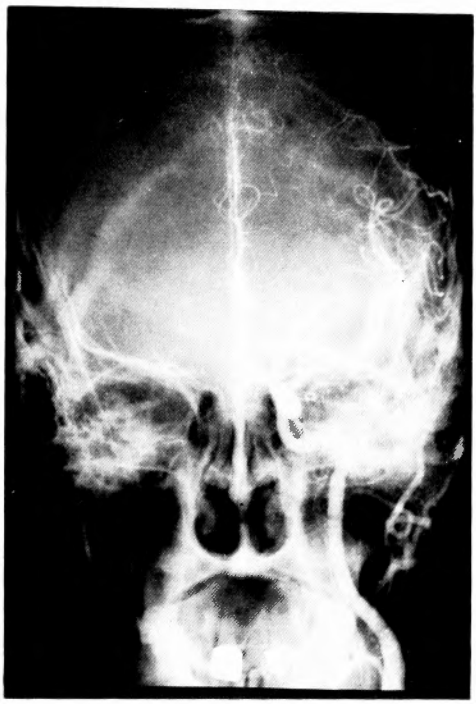


Fig. 1. Frontal projection of left carotid angiogram, showing an aneurysm of the anterior communicating artery.

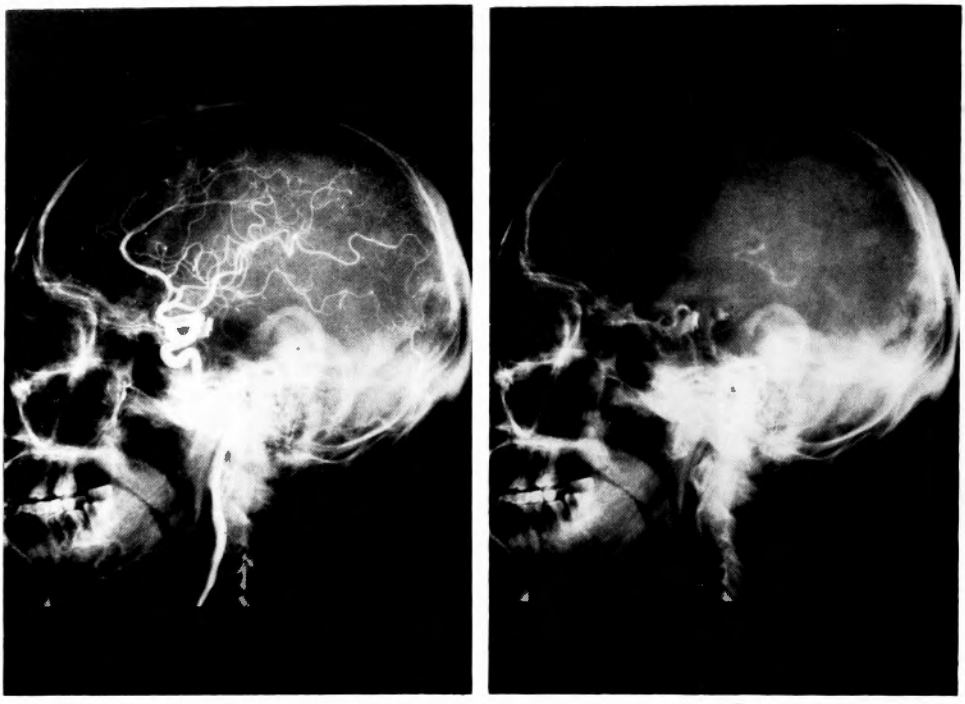
between the upper small portion with low density and the lower large portion with isodensity (Figure 2).

A ventricular drainage was performed. The ventricular fluid was under an increased pressure and tinged with the blood. Twelve hours after the accident, the left frontotemporal craniotomy was performed, and the neck of the aneurysm was obliterated with a Sugita's clip. The aneurysm was covered with fresh blood clot. It pointed anterior-inferiorly and toward the left, and its dome adhered tightly to the medial surface of the left optic nerve. At the time of operation, the condition of the patient was classified as grade III (Hunt and Kosnik).

Later, a ventriculoperitoneal shunt became necessary to control the increasing hydrocephalus. The patient did well after operations. When he was discharged 40 days after the accident, he was neurologically normal except for a minimal disturbance of recent memory. The postoperative angiogram confirmed a complete obliteration of the aneurysm (Figure 3).

Discussion

Since the report of Jamieson in as early as 1954[13], more than 60 cases have been reported of the extravasation from an intracranial aneurysm during angiography[1-12,14-32]. It seems certain that there exist many more unreported cases, and that the actual incidence of this serious complication of angiography is somewhat higher. In the past 10 years, the senior author has personally experienced three patients with this complication including the case herein reported, and



A B

Fig. 2. Lateral projection of left carotid angiogram, showing extravasation of contrast medium from the aneurysm.
(A) Arterial phase, (B) venous phase.

two of them expired.

Generally the extravasation of the contrast medium from an aneurysm is believed to represent a formidable complication of angiography with a high mortality. However, the cases who survived with or without deficits have been also reported. Reviewing the available literature, we could collect 13 such cases[1,4,5,9,10,18,20,24,27,30]. The pertinent clinical data in 14 survived patients including the present one were tabulated and compared with those in 47 fatal cases (Table 1).

Age and gender of the patients, kinds of the contrast medium, number of injections, and the size of the aneurysms did not differ in two groups. Sites of the responsible aneurysms distributed evenly in the anterior cerebral, middle cerebral and the internal carotid arteries in patients who survived, whereas the middle cerebral and the internal carotid aneurysms far outnumbered (85%) in patients who expired. In the group of expired patients, angiography was performed within 24 hours after the latest previous subarachnoid hemorrhage in 70%, and 64% of patients were semicomatose or comatose at the time of angiography. In the group of survived patients, on the other hand, angiography was delayed by 7 to 30 days in 36%, and six of 11 patients (55%) were alert at the time of angiography. In 27 of 33 patients who expired (80%), angiography was performed after an initial attack of subarachnoid hemorrhage, whereas four of 8 patients who survived (50%) had experienced two or three attacks prior to angiography. Furthermore, the

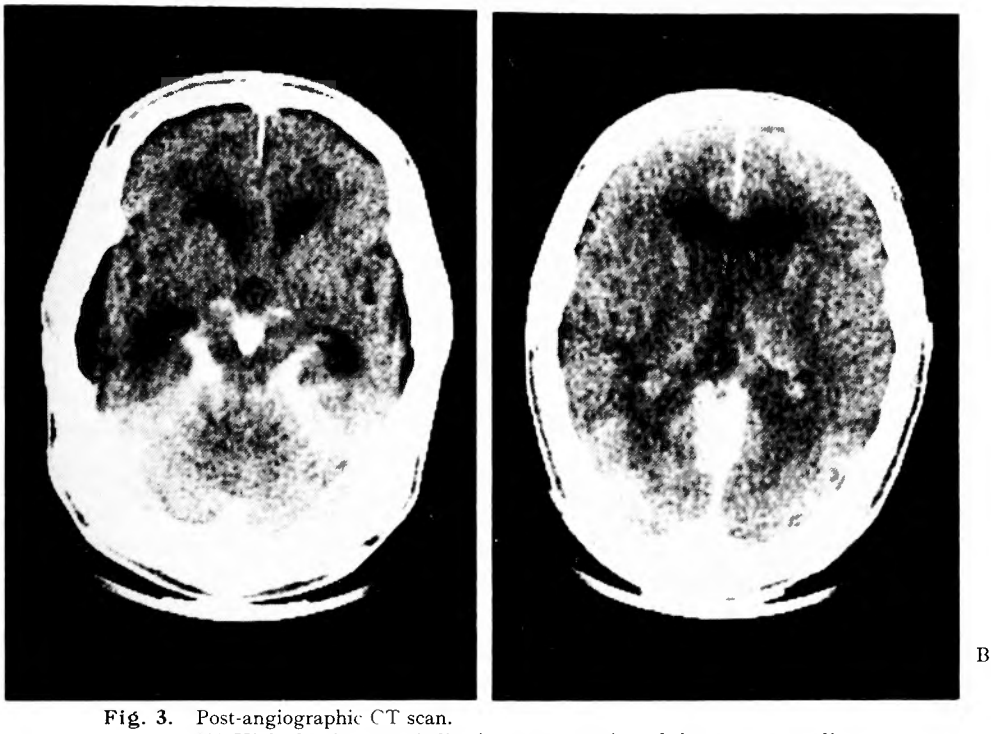


Fig. 3. Post-angiographic CT scan.
(A) High density area indicating extravasation of the contrast medium into the basal cisterns.
(B) Lateral ventricle is largely isodense except for small upper portion that is low in density.

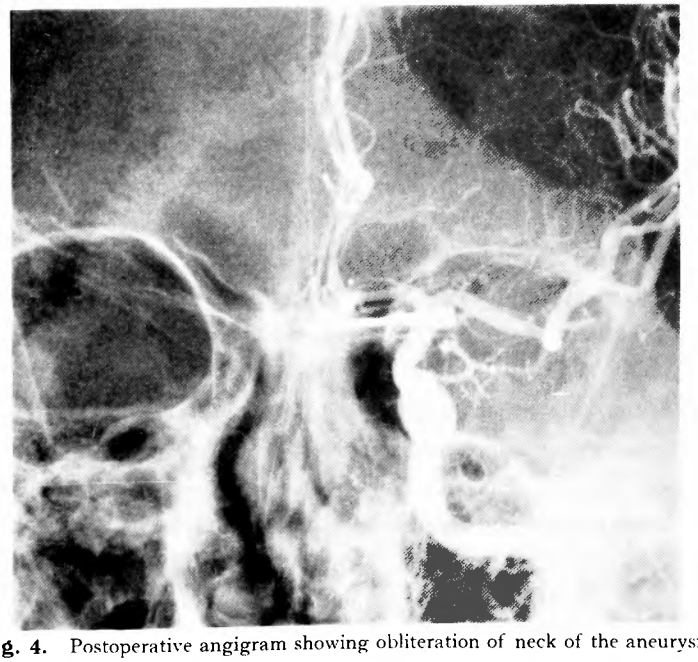


Fig. 4. Postoperative angigram showing obliteration of neck of the aneurysm.

Table 1. Clinical data in survived and expired patients with extravasation from intracranial aneurysm during angiography.
(♯: with/without intraventricular/intracerebral extravasation)

		Survived	Expired
Total Number		14	47
Location of aneurysm	ACA	5	4
	MCA	4	16
	ICA	4	18
	VA	0	2
	unknown	1	7
Interval between last SAH to angiography	-24 Hrs.	5	32
	1- 3 Days	1	4
	4- 7 Days	1	3
	7-30 Days	4	6
	unknown	3	2
Consciousness prior to angiography	clear	6	10
	drowsy/stupor	2	6
	semicoma/coma	3	28
	unknown	3	3
Number of previous bleedings	1	4	27
	2	3	5
	3	1	1
	unknown	6	14
Extent of extravasation	circumscribed	8	12
	diffuse ♯	3	28
	unknown	3	7
Operation	-24 Hrs.	7	11
	24 Hrs.-	3	3
	none	2	30
	unknown	2	3

extravasation was reported, or interpreted from the accompanying angiograms, to have been extensive with or without intracerebral or intraventricular extension in 28 to 40 patients (70%) who expired, whereas it was circumscribed in 8 of 11 patients (73%) who survived.

As the number of the reported cases is not large enough, we cannot draw any firm conclusion with regard to the factor(s) dividing the patients' outcome. However, it seems probable from the table that the extravasation from the anterior cerebral aneurysm fares better than that from the middle cerebral or internal carotid aneurysm. Furthermore, the prognosis seems to be less poor, either when the patient had had two or more previous attacks of subarachnoid hemorrhage, when angiography was performed in patients in better clinical condition several days to a few weeks after the latest attack, or when the extravasation was circumscribed.

The patient herein reported fortunately fulfilled most of these conditions; the anterior communicating aneurysm was the responsible one, he was alert and clinically stable at the time of angiography which was delayed until 4 weeks after the previous attack, and the extravasation was circumscribed and not diffuse. At operation, there was dense adhesions around the aneurysm that was covered by the fresh clot. The arachnoid at the base of the brain was very thick. The basal cisterns were divided further into multiple compartments by thick fibrous septa, and their

contents differed in qualities from the firesh blood in one place, to the blood-tinged cerebrospinal fluid in the other, and to the essentially clear cerebrospinal fluid in still other compartment. The adhesions and thickening of the arachnoid tissues apparently lessened the force of spillage and delimited the extension of the blood containing the iodinated contrast medium.

The repeated attacks of previous subarachnoid hemorrhage and a passage of several days to a few weeks between the hemorrhage and angiography are expected to promote the development of adhesions and thickening of the arachnoid at the base of the brain, and thus to restrict the extension of the extravasated blood containing the contrast medium when the re-rupture of the aneurysm occurs during angiography. Thus, the extent of the extravasation seems to be a single most important factor that determines the fate of the patients.

In the literature reviewed, 24 patients were operated on and 10 of them survived (41%), and 32 patients were conservatively treated and only two of them survived (6%). It seems, however, that the patients who were operated on and survived are apt to be reported more frequently than the cases who expired with or without operation, and the reported differences of outcome between the operated and non-operated groups may not represent the actual situation. Nevertheless, our experience seems to indicate that, although the extravasation from the aneurysm is a formidable complication of angiography, it is in itself not necessarily lethal and a significant number of patients with such a complication can be salvaged by the appropriate treatments including the early radical operation, particularly when the extravasation is relatively restricted to the basal cisterns.

References

1) Allan DM, Witcombe JB: Intracranial extravasation of contrast medium during carotid angiography. Br J Radiol **50**: 404–411, 1977.
2) Allcock JM: Aneurysms, In: Newton TH, Potts DG (Eds.), Radiology of the Skull and Brain, Vol 2, Book 4, Angiography, St. Louis, CV Mosby, 1974, pp 2435–2489.
3) Beamer YB, Corsino JF, Lynde RG: Rupture of an aneurysm of the internal carotid artery during arteriography with filling of the subarachnoid space and demonstration of a temporal lobe mass. Case report. J Neurosurg **31**: 224–226, 1969.
4) DeTribolet N, Oberson R, Zander E: Perangiographic rupture of a right posterior communicating artery aneurysm. Neurochirurgia (Stuttgart), **1**: 26–29, 1976.
5) Ferrari G, Vio M: Radiological demonstration of rupture of a carotid aneurysm during cerebral angiography. Case report. J Neurosurg **31**: 462–464, 1969.
6) Gerlock AJ: Rupture of posterior inferior cerebellar artery aneurysm into the subarachnoid space during angiography. J Neurosurg **42**: 469–472, 1975.
7) Goldstein SL: Ventricular opacification secondary to rupture of intracranial aneurysm during angiography. Case report. J Neurosurg **42**: 469–472, 1975.
8) Handa J, Aoyama I, Handa H: Extravasation from an intracranial aneurysm during angiography. Case report. Arch Jpn Chir **43**: 302–306, 1974.
9) Haraguchi S, Tsubouchi T, Ebina K, Suzuki K, Takita K, Kohgo T: Clinical significance of extravasation from intracranial aneurysm during angiography. Neurol Surg (Tokyo) **9**: 285–293, 1981.
10) Henry P, Guerin J, Vallat JM, Pouyanne H: Extravasation per-angiographique du produit de contraste au cours des ruptures d'aneorysmes (àpropos de 2 cas). Neurochirurgia (Stuttgart) **14**: 121–126, 1971.
11) Hoff JT, Potts DG: Angiographic demonstration of hemorrhage into the fourth ventricle. Case report. J Neurosurg **30**: 732–735, 1969.
12) Jackson JR, Tindall GT, Nashold BS, Jr: Rupture of an intracranial aneurysm during carotid angiography.

A case report. J Neurosurg **17**: 333–336, 1960.
13) Jamieson KG: Rupture of an intracranial aneurysm during cerebral angiography. J Neurosurg **11**: 625–628, 1954.
14) Jenkinson EL, Sugar O, Love H: Rupture of an aneurysm on the internal carotid artery during cerebral angiography. Case report. Am J Roentgenol **71**: 958–960, 1954.
15) Karadayi A, Lindqvist M, Tovi D: Rupture of an intracranial aneurysm with ventricular opacification during angiography. Case report. Neurochirurgia (Stuttgart) **16**: 59–62, 1973.
16) Kamiyama K, Onuma T, Sakamoto T, Suzuki J: Intraventricular extravasation of contrast media through ruptured intracranial aneurysm. Report of two cases. Neurol Surg (Tokyo) **6**: 1005–1013, 1978.
17) Koenig GH, Marshall WH, Poole GJ, Kramer RA: Rupture of intracranial aneurysms during cerebral angiography. Report of ten cases and review of the literature. Neurosurgery **5**: 314–324, 1979.
18) Koga H, Kaneko M, Hosaka Y: Extravasation from aneurysms during angiography. Surg Neurol **12**: 453–456, 1979.
19) Lehrer HZ, Gross LA, Poon TP: Ruptured intracranial aneurysm. Contrast agent extravasation during brachial arteriography. Arch Neurol **27**: 351–353, 1972.
20) Liliequist B, Lindqvist M, Probst F: Rupture of intracranial aneurysm during carotid angiography. Neuroradiology **11**: 185–190, 1976.
21) Mare JA, Schechter MM, Azar-Kia B: Intraventricular bleeding from cerebral aneurysmal rupture. Neuroradiology **5**: 184–186, 1973.
22) Murphy DJ, Goldberg RJ: Extravasation from an intracranial aneurysm during carotid angiography. Case report. J Neurosurg **27**: 459–461, 1967.
23) Murray JB, Wortzman G: Contrast medium extravasation from aneurysmal rupture during cerebral angiography. Clin Radiol **28**: 277–285, 1977.
24) Noda S, Tamaki N, Yamaguchi M, Matsumoto S: Giant suprasellar aneurysm with extravasation of contrast medium into the ventricular system. Surg Neurol **13**: 208–210, 1980.
25) Osgood C, Marcin LG: Intraventricular contrast extravasation during carotid angiography. Surg Neurol **2**: 49–50, 1974.
26) Sakamoto T, Yosimoto T, Suzuki J: Extravasation from an intracranial aneurysm during carotid angiography. Brain Nerve (Tokyo) **24**: 603–606, 1972.
27) Someda K, Yasui N, Moriwaki Y, Kawamura Y, Matsumura H: Extravasation of contrast material into subdural space from internal carotid aneurysm during angiography. Case report. J Neurosurg **42**: 473–477, 1975.
28) Teal JS, Wade PJ, Bergeron RT, Rumbaugh CL, Segall HD: Ventricular opacification during carotid angiography secondary to rupture of intracranial aneurysm. Case report. Radiology **106**: 581–583, 1973.
29) Triska H: Ein Fall von Kontrastmettelextravasat bei einem ruptierten Aneurysma der Arteria cerebri media. Zbl Neurochir **22**: 291–295, 1962.
30) Waga S, Kondo A, Moritake K, Handa H: Rupture of intracranial aneurysm during angiography. Neuroradiology **5**: 169–173, 1973.
31) Wilkins RH: Aneurysmal rupture during angiography. Does acute vasospasm occur? Surg Neurol **5**: 299–303, 1976.

和文抄録

造影剤漏出を認めた脳血管撮影中の脳動脈瘤再破裂の1救命例

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脳血管撮影中の脳動脈瘤再破裂による造影剤漏出は最も重篤な合併症の一つであり，その予後は著しく不良であると考えられている．しかし，近年，適切な外科的治療による救命例の報告も散見される様になった．

本例は53才男性で，発症後30日目の脳血管撮影で，前交通動脈瘤の再破裂による造影剤漏出をきたしたが，脳室ドレナージ及びネッククリッピングを行い救命し得た症例である．

文献上47例の死亡例と自験例を含む14例の救命例につき，予後に及ぼす因子について比較分析した．年令・性・造影剤の種類・注入回数や動脈瘤の大きさには両者に差は認められなかったが，救命例の多くは，血管撮影時の意識状態は良好で，最終発作から血管撮影までの期間が長く，また数回の発作を有していた．その他前交通動脈瘤は内頸動脈瘤や中大脳動脈瘤に比べ比較的予後良好であった．最も重要な因子は，造影剤漏出の範囲で，造影剤漏出が限局している症例に救命例が多く認められた．この様な症例は，動脈瘤周囲のくも膜の肥厚・ゆ着が高度であると推定されるが，適切な外科治療により，必ずしも予後は不良ではなく，積極的な治療が要求される．